MINTER
User's Manual

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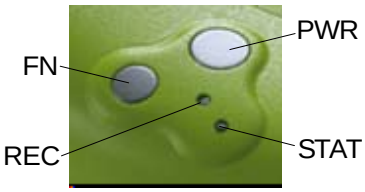
General Description



MINTER (MINimum INTERface) is a simple user interface that consists of two keys and two LEDs, which can control and display the operation of the receiver.

MINTER brings a new level of automation to the GPS field operation. Its function is similar to what is available on advanced photo cameras, where the camera takes several light and distance measurements, adjusts all the settings of the camera, and conveys the ready status of the camera (by a green light) for the photographer to push the button.

Behind the simple appearance of MINTER, there are sophisticated algorithms and tests that ensure reliable data collection and recording.

MINTER performs the following functions:

- Turns the **receiver On** or **Off**, or put it in the **Sleep** mode. When in Sleep mode, the receiver will turn on in response to any activity on the RS232 port.
- Turns data **recording On** or **Off**.
- Shows the number of GPS and GLONASS satellites that are being tracked.
- Shows data recording status.
- Shows each time data is recorded to internal memory.

MINTER has one Satus (STAT) LED and one Recording (REC) LED. Each LED has three colors: red, green, and yellow.

MINTER has an ON/OFF key (PWR) and a function key (FN).

MINTER also has protection against stuck keys (e.g. when a key is held down unintentionally for a long time by other objects in a backpack.)

PWR Key and STAT LED

To turn on the receiver, push the PWR key and release it. To turn it off, press the PWR key for more than 1 and less then 4 seconds, during this period the STAT LED remains off to assist you.

To put the receiver into Sleep Mode, press the PWR key for more than 4 and less than 8 seconds; during this period the STAT LED is yellow. While in Sleep Mode, any activity on an RS-232 port will turn the receiver on.

If you press the PWR button for more than 8 seconds, it will be ignored. This is done to protect the receiver operation against stuck keys. When the receiver is ON and no satellites are tracked, the STAT LED is red. Instead, this LED will blink as follows:

1. Green for each GPS satellite being tracked;
2. Pause, if at least one satellite has the energy potential more than 48 db*Hz, red blink instead;
3. Yellow for each GLONASS satellite being tracked;
4. Pause, if the receiver can estimate its navigation position, red blink if it can't.

For example, if 8 GPS and 5 GLONASS satellites are being tracked, the STAT LED repeatedly blinks 8 greens and 5 yellows between successive pauses or reds.

FN Key and REC LED

Holding the FN key for less than 1 second ('click') either switches between different information modes (normal, extended information, internal modem status), or between static and dynamic post-processing modes, depending on the receiver' configuration. During the first second of holding the FN key, the REC LED is yellow.

Holding the FN key for more than 1 and less than 5 seconds will start/stop data recording. During this period the REC LED is green. The status of data recording is shown by the REC LED. Data recording is ON when REC LED is green or yellow; data recording is off when this LED is OFF. If REC LED is red, it indicates a hardware problem with data recording (e.g. memory is full).

The green light of REC LED blinks each time the data is written to the internal file. The data recording time interval is what has been programmed in the receiver (by a hand-held interface device or a computer).

Each time data recording is turned off and on, either a new file is opened and automatically named by the receiver (using date and time), or data is appended to a particular file, depending on the receiver configuration.

Holding the FN key for more than 5 and less than 8 seconds will turn baud rate of the serial port A to 9600. After about 5 seconds of holding the FN button the REC LED becomes red, and you need to release FN button while REC LED is red (during next 3 seconds).

Holding the FN key for more than 8 seconds has no impact.

After turning the receiver on, loading a new firmware, or clearing the receiver NVRAM, receiver checks its internal file system. During this operation, the REC LED flashes yellow, and the file system is not accessible for CDU applications or for data recording. This operation may require from fractions of a second to several seconds, depending on the reason it started and the amount of the internal memory.

The table below summarizes FN key functions and REC LED statuses.

FN key	REC LED	Meaning
Not pressed	Flashes yellow	Internal file system test in progress.
	Off	No data recording
	Green	Data is recording (dynamic or unknown post-processing mode)
	Yellow	Data is recording (static post-processing mode)
	Red	Hardware problem with data recording (memory full?)
No data recording, is pressed:		
less than 1 second	Yellow	Release to change the information mode
from 1 to 5 seconds	Green	Release to start recording
from 5 to 8 seconds	Red	Release to turn the Serial A speed to 9600 bps
more than 8 seconds	Off	No function
Data recording, is pressed:		
less than 1 second	Green	Release to change the information mode or post-processing mode to static
	Yellow	Release to change the post-processing mode to dynamic
	Red	No function (hardware problem with recording)
more than 1 second		Turns data recording off

How to Clear NVRAM

It is possible to clear NVRAM using only MINTER. To do that:

1. Turn the receiver OFF.
2. Press and hold FN button.
3. Press and release PWR button to turn the receiver ON.
4. Wait until both LEDs will light green.
5. Wait around five seconds, until both LEDs will blink yellow.
6. Release FN button.

Note that LEDs will blink yellow only during next five seconds, and to clear NVRAM it is essential to release FN button when they blink yellow.

Extended Information (EI) Mode

In this mode the receiver continues work as usual, but the STAT LED indicates extended information, useful for test purpose.

To switch to EI mode click either FN or PWR button on MINTER. 'Click' means push and quickly release (inside one second). To switch back to normal blinking click either button once again (two times, if an internal modem is present).

In the EI mode receiver blinks 7 times per cycle. Each blink could be yellow, red or green. Yellow means that information for test isn't available. Green means test is passed. Red means test is failed.

1. Delimiter. It is easily distinguishable double-blink. Its color is calculated from colors of other blinks. It is yellow if at least one of blinks is yellow. It is red if no other blinks are yellow and there is at least one red blink. It is green in all other cases.
2. Enough data for position computation.
3. GPS S/N ratio is good (see below).
4. GLONASS S/N ratio is good (see below).
5. Oscillator frequency offset is not more than 3 ppm.
6. Oscillator's Allan Variance is better than 2.7e-10.
7. Continuous tracking time is more than 15 minutes.

Thresholds for S/N ratios (dB*Hz) are:

	CA/L1	P/L1	P/L2
GPS	51	39	39
GLONASS	51	49	40

The simple interpretation of testing requires only delimiter double-blink color to be watched for. If it is green — all is OK, if it is yellow — need to wait more, if it is red — some tests failed.

With good receiver, antenna and observation conditions, all blinks should be green in 10 minutes after power on.

Internal Modem Operation Status

This information mode is available only if the receiver is equipped with an internal spread spectrum radio modem.

To switch to mode, click either FN button on MINTER two times (one, if already in EI mode). 'Click' means push and quickly release (inside one second). To switch back to normal blinking click either button once again.

1. When modem is turned off, the STAT LED blinks short red 2 times per second.
2. When modem is turned on, but no data is transmitted/received, LED blinks long red 2 times per second.
3. When modem sends data, LED blinks long yellow two times per second.
4. When modem receives data, LED blinks long green two times per second.